

Q1. Do you agree that transitioning to reactive power priority will better support voltage regulation and help to reduce distribution upgrade costs associated with high penetrations of DERs, and if so, why? Parties should offer the pros and cons of adopting reactive power priority.

Yes, reactive power priority will help to minimize negative impacts PV can have on the grid, will move us in the direction of allowing higher PV penetrations and with the appropriate advanced inverter function settings will allow PV systems to improve stability and power quality.

Active power priority, on the other hand, is likely to increase voltage fluctuation and increase variability in reactive power output at times when that reactive power output is needed most, near full power output of PV systems. NREL's VROS study (www.nrel.gov/docs/fy17osti/67485.pdf) says

*Activating GSF with **reactive power priority**, as opposed to active power priority, **is recommended** for Hawaiian Electric to avoid momentary overvoltages. When implementing the GSF with active power priority (CA Rule 21 implementation), momentary overvoltages are observed at peak PV system production hours because reactive power support drops to zero during very high irradiance values to accommodate for real power production. **Momentary overvoltages higher than 110%** of nominal voltage cause PV systems to turn off according to IEEE 1547-2003, which would be more detrimental to PV customers' energy production.*

And

*The data shows that **watt priority causes voltage spikes** during peak PV-system production hours, and that those spikes reach 1.1 pu which, in the field, could cause PV systems to go offline.*

We concur with NREL's assessment.

CA Rule 21 Phase 1 now calls for VoltVar to be the default mode of operation along with VoltWatt (if available). The default VoltVar settings which range from +/- 0.30 Qpu are moderate in magnitude and should minimize customer energy curtailment as well as reactive power loading of the feeder.

A copy of the approved SCE Advice Letter 3623-E is available at:

- [Advice 3623-E, Southern California Edison Company's Proposed Modifications to Electric Tariff Rule 21 to Incorporate Smart Inverter Settings and Other Supporting Implementation Related Revisions](#)

Which show the latest default settings for CA Rule21 Phase 1.

Q2. Does the proposed tariff language adequately reflect the goal of the text change, i.e. to ensure reactive power priority, and if not, how can the text be modified?

We propose the following edits:

Section Hh.2.j. edits

The Smart Inverter shall be capable of operating dynamically within a power factor range of +/- 0.85 PF for larger (>15 kW) systems, down to 20% of rated power, and +/- 0.9 PF for smaller

systems (≤ 15 kW), down to 20% of rated power, ~~based on available reactive power~~. This dynamic volt/var capability shall be able to be activated or deactivated in accordance with Distribution Provider requirements.

When Volt/Var is activated, the Smart Inverter shall provide reactive power irrespective of the effect on active power. The ~~reactive power provided shall be based on available reactive power, but the~~ maximum reactive power provided to the system shall be as directed by the Distribution Provider.

Section Hh.2.i should also be modified for consistency in case there are situations where fixed Power Factor are desired.

i. Power Factor

Producer shall provide adequate reactive power compensation on site to maintain the Smart Inverter power factor near unity at rated output or a Distribution Provider specified power factor in accordance with the following requirements. The Smart Inverter shall provide reactive power irrespective of the effect on active power to meet the power factor specified:

ii. Aggregate generating facility is greater than 15 kW: 1.0 +/- 0.15 (0.85 Lagging to 0.85 Leading) down to 20% rated active power ~~based on available reactive power~~

iii. Aggregate generating facility is less than or equal to 15 kW: 1.0 +/- 0.10 (0.90 Lagging to 0.90 Leading) down to 20% rated active power ~~based on available reactive power~~

Q3. Is the proposed date optimal and achievable, and if not, what is the preferred date and why? Please be specific in your reasoning. For instance, you may indicate what tasks and lengths of time are necessary to comply.

Yes, for SunPower Equinox (residential systems), we have already performed UL 1741SA Listing to the CA Rule21 SRD's operating in both Active and Reactive Power Priority. So we are capable of changing over at any time merely by changing the grid profile settings.

For our commercial side of the business it depends upon availability of inverter manufacturers to support this rollout.

Will systems that are already in the field be required to be retroactively updated to new requirements when they become effective? This would likely be difficult in cases of cash sales or systems that do not have remote communications enabled. Who would pay for the cost to communicate with and upgrade systems that have already been installed?

Can we get permission to activate Reactive Power Priority for systems installed prior to the required date?

Q4. If the change to reactive power should not be adopted, please give specific reasons why not. Parties may provide any research and/or evidence available to demonstrate from a technical standpoint that real power priority should be kept in favor over transitioning to reactive power priority.

No comment.

Other:

Another issue for consideration is that of compensation for curtailment of energy production. If curtailment exceeds 1% should there be a mechanism for compensation?

System level designers can control the probability of curtailment through adjustment of the system DC/AC Ratio. Just as high DC/AC ratios create the potential for clipping, they also increase the probability of curtailment.\